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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/854,304	05/11/2001	Robert J. Bernardi	18864-04962US	7812

32681 7590 10/19/2005

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ART UNIT	**PAPER NUMBER**
2644	

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/854,304	Applicant(s) BERNARDI ET AL.	
	Examiner Andrew Graham	Art Unit 2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 28 July 2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-33 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-33 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 7/28/05 have been fully considered but they are not persuasive.

On page 10, lines 5-9, the applicant has stated, "Because Carlson only utilizes one input microphone, Carlson also cannot produce an error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to the desired acoustic source that results in the acoustic signals received by the acoustic pick-up device failing to achieve proper or adequate noise cancellation". The examiner respectfully disagrees. The language in the pertinent claims that details that which the error signal "represents" is functional language. Such functional language, as it pertains to the apparatus claims of independent claims 1 and 19, is permissible per MPEP 2114. However, this section of the MPEP also clearly stipulates that claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In the present case, the claimed "error signal" of Claims 1 and 19 is a single signal with a particular characteristic indicative of a particular condition. In the applicant's specification, for example, such the characteristic of such a signal is the amplitude (electrical HIGH or LOW) of the signal (44) passed from a comparator (42) (see paragraphs 0038-0040 and Table 1, for example). The ultimate nature of this signal is one of two states, corresponding to one or two voltages (or, technically, voltages grouped under one of

two acceptable ranges) of that which represents a logical one and that which represents a logical zero. The same type of signal is output by the threshold detection circuits of the system of Carlson. The outputs of these circuits, such as 24 and 25, are also signals of "high" and "low" nature, which, as is well-known in the art, corresponds to a signal with a relatively high voltage level or a relatively low voltage level. Thus, regardless of what is represented, such as the newly amended 'failing to achieve proper or adequate noise cancellation', the error signal of the present claims, at least so far as such a signal corresponds to the electrical properties or structure of a signal, does not provide distinction from the signal output from the threshold signals of Carlson. Also regarding structure, the nature of the acoustic pickup device is addressed at least in regards to the teachings of Andrea.

So far as the above argument pertains to the methods recited in the other independent claims in the application, the reference of Carlson in view of Andrea are considered to the make obvious the concept of 'representing' in view of the functions performed by the two respective references, and particularly the analogous nature of the function(s) of certain components in the two references. An acoustic pickup device comprising one microphone, such as that taught by Carlson, or comprising two microphones, such as that taught by Andrea, both establish or produce a single signal, with a corresponding set of signal characteristics. Both of the claimed situations to be "represented", angular or distance mispositioning,

affect the amplitude of such a single, produced signal, regardless of the employed pick-up device. For a single transducer, a non-acceptable angle (such as represented by the areas above and below the vertical limits of the acceptable solid angle shown in Figure 2 of Carlson) result in a decreased amplitude, by virtue of the relative distance between a user's mouth and the microphone increasing, and the physical property of sound waves that the amplitude of a wave decreases exponentially with increasing distances. A non-acceptable distance, such as outside or greater than an acceptable range of distances (represented as to the right of the horizontal axis of the solid angle shown in Figure 2 of Carlson) would have resulted in an decreased amplitude of received sound, also by virtue of the same physical properties of sound waves listed above. Similarly, for a pick-up device comprising two transducers connected in a subtractive or noise-cancelling manner, a non-acceptable angle would have resulted in a decreased amplitude of the single, composite output signal of the pick-up device, by virtue of the relative distance between a user's mouth and the microphone increasing and/or an increased amount of the same signal sources being picked up, and then subtracted, by the two microphones. A non-acceptable distance greater than an acceptable range of distances for a subtractive microphone would have also resulted an decreased amplitude of received sound, at least by virtue of a negligible amount of sound reaching at least the non-subtracted microphone in the pick-up device. Again, these effects are based on known, fundamental, scientific properties of both sound and the pickup

device arrangements. The underlying principle is that each form of mispositioning influences the amplitude of the output of either a single or dual, subtractive microphone pick-up device. As far as such influences are represented in the amplitude characteristic of the single output signal produced by either form of pickup device, such influences would be detected and indicated by the output signal of the threshold components in the system of Carlson, at least making the claimed "representing…" limitations of the pending claims obvious.

On page 10, lines 16-17 and 19-22, the applicant has stated, "The goal of noise cancellation is to result in a high signal to noise ratio" and "Moreover, the amount of that difference, for purposes of noise cancellation, should be sufficiently high in order for the noise to be cancelled out while preserving a relatively high level of the desire acoustic signal, so as to achieve maximum signal to noise ratio". These statements inherently acknowledge that the idea that "the concept of noise cancellation" includes ratios and amounts of acoustic difference that are not high or are not sufficiently high, lest there would not exist "a high signal to noise ratio" or an "amount of difference" that "should be substantially high" as denoted by the applicant. The applicant has also noted "Andrea discloses two input microphones for the purpose of noise cancellation" and "the goal of Andrea is noise cancellation"(page 10, lines 15-16 and 28). Thus, by the applicant's admission, the "goal" of Andrea inherently acknowledges the existence of ratios or signal differences that are not "high" or "sufficiently high", even if such ratios are non-

preferred by virtue of their not being the "goal" ratios or differences. However, per MPEP 2123, a reference is valid for all that it teaches, including non-preferred embodiments. Thus, ratios or signal differences that are not "high" or "sufficiently high", even if such ratios are non-preferred, are part of the valid, applicable teachings of Andrea. Accordingly, the reference of Andrea does not teach away from any positioning of the microphones that fails to achieve proper or adequate noise cancellation as proposed in remarks on page 10, lines 28-30, by virtue of the inherent characteristics of a noise cancellation system, denoted by the applicant.

On page 11, lines 18-21, the applicant has stated, "In other words, Andrea mentions that the performance of the noise-canceling microphones can indeed be so adversely affected that speech may be canceled, i.e. that the two microphones no longer operate satisfactorily". The examiner respectfully notes, however, that such a notation is that of a non-preferable situation. Per MPEP 2123, a reference is valid and applicable for all that it teaches, including such a non-preferable situation. Such a non-preferred intended use, relative to an intended use of maximum noise cancellation, does not preclude the application of what the underlying science and structure teaches or fairly suggests. The teachings of Carlson clearly indicate that telephones, which would include that taught in the system of Andrea, can be and are mispositioned by their very nature.

On page 12, lines 17-20, the applicant has stated, "noise canceling microphones of Andrea could only be used by Carlson

separately and distinctly, mutually exclusively, from the use of the first microphone in determining whether the first microphone is correctly positioned". The examiner respectfully disagrees. In both microphone arrangements, a single signal representing the input voice signal is established (output of pre-amplifier (22), col. 6, lines 7-8 of Carlson as well as amplifier 1940, Figure 28; output over pre-amplifier(16), col. 15, lines 18-25 and 43-46 of Andrea). The signal of Andrea, however, is, when the microphones are employed in a directional matter, reduced in terms of content from an undesired direction, such as a background source, which provides motivation for at least using a second microphone with the single microphone of Carlson, along with the necessary circuitry for combining the two microphone outputs to a single signal (col. 12, lines 62-66 of Andrea). Andrea also teaches, however, that a two microphone arrangement enables two different modes of operation to be obtained, one of which utilizes only one of the two microphones in the system (col. lines 47-55). As such, the inclusion of the second microphone of Andrea would not have altogether eliminated the initial, single microphone capability of the microphone of Carlson, but rather improved the overall operation of the device by including a noise-canceling mode. As part of the interpretation of the pending claim language and the teachings of Carlson and Andrea, it is noted that the amplifier of Andrea that combines the two signals to form a single output signal is considered part of the "position estimation circuit".

On page 12, lines 21-25, the applicant has stated, "Thus, even if the noise canceling microphones of Andrea were incorporated into the apparatus of Carlson, such combination would not read on the position estimation circuit producing the error signal ... from the audio signals from the first and second microphones as generally recited in the claims". The examiner respectfully disagrees. Substituting the microphones (12,14) and preamplifier (16) of Andrea for the microphone and pre-amplifier (22) of Carlson would have provided an input to the threshold circuitry (24,25,61) of Carlson based on either an omnidirectional microphone pickup or a noise cancelled microphone pickup. The thresholds of Carlson are at least equated to proper spacing between the microphone pickup and a user's head (col. 3, lines 34-43) and thereby address the concept of "mispositoning", even in the amended version of the claims. The outputs of the threshold circuits indicate proper or improper positioning (col. 6, lines 29-42 and 54-59; col. 7, lines 7-11). As such, the threshold circuitry (24,25,61) of Andrea in use with the two microphone input (12,14) of Andrea teaches "the position estimation circuit producing the error signal from first and second audio signals" as generally recited in the claims. It is further noted that the switch (1910) of Andrea may be considered part of the "position estimation circuit", such that, regardless of the open or closed nature of the switch, two microphone inputs are provided to the circuit (col. 33, lines 58-64; Figure 28 of Andrea).

On page 13, lines 13-16, the applicant has stated, "Thus, the talk-thru mode of Andrea, either alone or in combination with Carlson would not read on the elements as generally recited in the claims in which both microphones receive and transducer acoustic signals into audio signals, the position estimation circuit using the audio signals from both microphones to generate the error signal". The examiner respectfully submits, however, that talk-thru mode does not prevent both microphones from transducing an acoustic signal, and that, as noted above, the switch (1910, Figure 28) of Andrea may be considered part of a "position estimating circuit", such that signals from the microphone are applied to the "position estimating circuit", regardless of the mode. It is further noted that the relevant language in Claims 1 and 19 regarding the two inputs and the error signal, "produce therefrom" does not clearly specify nor mandate a particular use of the two inputs in forming the error signal. As such, it does not preclude an interpretation of the pertinent claim language that does not use both signals. Regardless, at least the noise canceling mode meets the presented claim language.

On page 13, lines 1-8, the applicant has stated that the talk thru mode of Andrea with the teachings of Carlson fails to read on, "a controller that uses the error signal to compensate for the mis-positioning of the acoustic pick-up device by providing audio signals from the first and/or second microphones to the output". The examiner respectfully notes however, that the references of Carlson and Andrea were not relied upon in the previous or present action for teaching

such a controller. Andrea discloses that the noise canceling or omnidirectional operation modes may be connected through switches (1910,1925,1920; col. 33, lines 63-67; col. 34, lines 1-2). Ruegg discloses a system for switching between a single and a combined microphone input source, wherein the switching is performed automatically based on a comparison of an input signal and a threshold (col. 3, lines 14-40). The teachings of Ruegg in combination with Carlson and Andrea, rather than Carlson and Andrea alone, are relied upon for teaching such a controller. The motivation behind using the switch control circuitry of Ruegg would have been the capability of automatically determining the presence of a desired sound source in a desired direction, resulting in the appropriate signal processing.

On page 13, lines 17-18, the applicant has stated, "However, although Ruegg's hearing aid contains two microphones 11 and 12, Ruegg alternately utilizes only one of the two microphones at any given time". The examiner respectfully notes, however, that such utilization is not precluded as part of the broadest reasonable interpretation of the pertinent claim language. Again, "produces therefrom" does not specify a particular manner of use for the two received inputs. Also, the examiner respectfully notes that the results of the switching are analogous between the systems of Ruegg and Andrea in terms of the sound field represented in the output signal. Alternately stated, the switches in both Andrea and Ruegg have one position that corresponds to an omnidirectional signal and one position that corresponds to a directional signal. The

directional microphone of Ruegg receives sound from a predetermined direction, not the entire background, as is represented in the output of the noise cancelled microphone signal of Andrea (col. 1, lines 16-21 and 26-32 of Carlson in comparison with col. 7, lines 4-8 and 21-29 of Andrea).

On page 14, lines 6-8, the applicant has stated, "Ruegg fails to disclose a position estimation circuit that produces the error signal from the audio signals generated by the first and second microphones". The examiner respectfully disagrees. Again, as noted above in regards to the combined teachings of Carlson and Andrea, the switch (23) of Ruegg may be interpreted as part of the claimed "position estimation circuit", and thus the error signal (24) is produced with these two signals as inputs (or "produces therefrom", as claimed). Again, the presently pending claim language does not clearly recite a manner in which two such input signals, such as in Ruegg or Andrea, are used that precludes the interpretation of the teachings of Carlson in view of Andrea and Ruegg from being read upon said language.

On page 14, lines 9-11, the applicant has stated, "the control signal generated by Ruegg estimates whether the user is in a conversation with another person or in a general background of sounds, such as being in traffic, and is not an error signal that estimates the device being mispositioned". The examiner respectfully disagrees. As generally noted above, the state of being "mispositioned" must be considered in terms of its physical implications for the system. As acknowledged by the applicant on page 6, lines 13-15, the system of

Ruegg controls a switch depending on an amplitude received from the microphones (col. 3, lines 14-40). As also noted by the applicant, the directional microphone (12) aligns the input sound field with the line of sight for conversing with another person (col. 1, lines 14-23). The switching back to the microphone 11 occurs when a signal is absent from an amplifier output (col. 3, lines 35-40). This absence of a signal does not, however, mean that a conversation is not taking place. Rather, the configuration allows for a signal to be received by omnidirectional microphone (11), but not by the directional microphone (12) because of the directionality of the sound field received by the microphone (12). In such a context enabled by the system of Ruegg, the signal that affects switching back would have represented an error or mispositioning with respect to the purpose of the directional microphone for receiving conversation acoustic signals. Also, the directional microphone (12) is not used when the amplitudes received by either microphones (11,12) fail to surpass established thresholds. Carlson clearly teaches that signal sources that are too distant fail to surpass input thresholds (col. 3, lines 34-38). Accordingly, sources of audio - including persons involved in a conversation - that are too distant to surpass the thresholds of either microphones (11,12) may also represent an improper relative positioning of the microphones. Accordingly, of the control signals in either of such situations represent error signals. A recitation of the intended use of the claimed invention, such as a signal representing an 'error' condition, must result in a structural

difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. As discussed above, it is respectfully submitted that the threshold based detection of Ruegg, in particular view of the threshold detection of Carlson, would have been able to determine a contextual 'error' condition.

On page 14, lines 17-18, the applicant has stated, "There is also a lack of motivation to incorporate Ruegg's directionality switching circuitry into the combination of Carlson and Andrea". The examiner respectfully disagrees. As noted above, the switch control circuitry of Ruegg would have provided the capability of automatically determining the presence of a desired sound source in a desired direction, resulting in the appropriate signal processing.

On page 15, lines 1-12, the applicant has noted the rejection of the other claims, stating that such rejections do not overcome deficiencies of the rejection of parent claims involving Carlson in view of Andrea and Ruegg. As such alleged deficiencies have been addressed and refuted in the above responses, the rejection of these other claims has also been reviewed, determined proper, and hereby maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-10, 13-15, 19-25, 27-29 and 33** are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al (USPN 4777649) in view of Andrea et al (USPN 5732143) and Ruegg (USPN 3875349). Hereafter, "Carlson et al" will be referred to as "Carlson" and "Andrea et al" will be referred to as "Andrea".

Carlson discloses a system for providing repeatable microphone positioning and input volume for a telephone handset. The input to the system is provided through a microphone (15) and a pre-amplifier (22) (col. 6, lines 7-8). This signal is then averaged (23) and applied to a variety of threshold detectors (24,25,61,24a,24b,25a,25b) (col. 6, lines 8-11; col. 7, lines 3-44 and 60-65; col. 9, lines 4-9 and Figures 9-12). In the system of Carlson, these sound pressure levels are associated with the distance between the handset and the user's mouth (col. 3, lines 34-66). An input level above one threshold is equated to the microphone being too close to a user's mouth and an input level below a second threshold is equated to the microphone being too distant from a user's mouth (col. 3, lines 34-46). These threshold detectors produce signals that are used to control the operation of switches (37, 45, 65) that give the handset user indication regarding an improperly positioned microphone (col. 9, lines 1-16). The indication fed back to a user is described by

Carlson as a position indicator (col. 7, lines 60-65). The threshold detectors and their controls read on "a position estimation circuit coupled to receive the audio signals". The threshold detection signals emitted by the detectors (24,25,61) reads on "adapted to produce therefrom an error signal" (in view of input signals discussed below) and "the error signal representing an estimate of the acoustic pick-up device having angular and/or distance mispositioning relative to the desired acoustic source". These signals are considered to herein to be an "estimate", as suggested by the submitted claim language, in the sense that Carlson notes that a user's volume may affect a perceived volume instead of the positioning, and that the average of a period of input is used, which may be affected by the spoken sentences (col. 4, lines 16-28).

However, as noted above, the input of Carlson appears to be only based on one input microphone. Thus, Carlson does not specify:

- an acoustic pick-up device having a first microphone and a second microphone, wherein the microphones are disposed at a distance from each other and receive acoustic signals from a desired source
- that the mispositioning results in the acoustic signals received by the pickup device failing to achieve proper or adequate noise cancellation and resulting in the audio signals being degraded

Andrea discloses a system that involves the use of two microphones to cancel noise during the use of a communication device,

such as telephone handset or headset. A handset embodiment is generally illustrated in Figures 1 and 3A-3B and a headset or boom microphone embodiment is generally illustrated in Figures 6A-6C and 9A-9E. The input to the system is provided through a pair of microphones (col. 12, lines 41-54; col. 19, lines 11-19). The two inputs are subtracted at an amplifier (16) in order to remove the noise component of the transmitted signal (col. 12, lines 55-66). The first microphone (12) is disclosed as being preferably less than an inch away from the desired sound source and Figure 3a shows that the second microphone is further from the sound source than the first microphone (col. 14, lines 2-6). The two microphones (12,14) read on "an acoustic device having a first microphone disposed at a first distance from a desired acoustic source" and "second microphone disposed at a second distance from the desired acoustic source". The functioning of these microphones reads on "receiving acoustic signals generated from the desired acoustic source, and in response, transducing the acoustic signals into audio signals". The microphones are able to operate in a noise canceling mode and a talk-thru mode (col. 33, lines 44-58). Switches (1910,1925,1930) are used in the talk thru mode to disable the first microphone (1900) such that the second, omnidirectional microphone (1901) provides the overall input for the system (col. 34, lines 38-43). This allows sound sources other than those included in the noise canceling response area to be provided to the output of the system (col. 34, lines 55-66). The inherent, operational principles of a noise cancellation system in

view of the conceptual angle discussion of Andrea (so far as analogous science and results may be associated to an angular or distance microphone mispositioning), when taken in view of the angular and distance mispositioning taught in Carlson, read on "that results in the acoustic signals received by the pickup device failing to achieve proper or adequate noise cancellation and resulting in the audio signals being degraded angles" (col. 14, lines 7-64).

To one of ordinary skill in the art at the time the invention was made, it would have been obvious to substitute the two microphone (12,14), preamplifier (16), and associated circuitry of Andrea for the single input (15) and pre-amplifier (22) arrangement of the pick-up part of the system of Carlson. The motivation behind such a modification would have been that such a dual microphone would have been able to cancel noise from the input signal, while still including the alternate capability of inputting all directionalities of sound from the environment.

Yet, Carlson in view of Andrea does not specify:

- a controller using the error signal to compensate for the acoustic pick-up device being mispositioned by providing the audio signals from at least one of the microphones to an output

However, Ruegg teaches a system for, based on an input sound level, adjusting the shape of a microphone directivity pattern for a hearing aid. As part of the background of the art, Reugg teaches that a predetermined direction is associated with a directional microphone

characteristic, and a spherical sensitivity is associated with the general sounds of the surroundings (col. 1, lines 16-36). The difference between these sound directions is associated with received input levels above a threshold values, wherein the levels below are associated with a spherical directivity pattern and the levels above are associated with a pronounced directional characteristic, so that a user may hold a conversation with another person at a predetermined direction and distance (col. 2, lines 8-18). The automatic version of the device is shown in Figure 2, wherein a reversing switch (23) performs the switching and the state of the switch is based on a signal output by the amplifier (19) (col. 3, lines 14-28). The switch is affected by the level of the signal from one of the microphones exceeding a threshold level (col. 3, lines 18-24). The first microphone (11) shown has a spherical sensitivity characteristic and the second microphone (12) shown has a directional characteristic (col. 2, lines 60-67). As stated above, the directional characteristic is associated with a desired source in a predetermined direction and distance (col. 1, lines 16-21 and col. 2, lines 8-17). Thus, the switching to the spherical sensitivity pattern in the presence of a desired signal source is equivalent to the relative mispositioning between the pick-up system and the desired signal source. Thus, the amplifier (19) with its second output (24) reads "a position estimation circuit coupled to receive the audio signals from the first microphone and the second microphone" and "adapted to produce therefrom the error signal". It is also hereby noted that

these particular limitations are considered to be met by the proposed combination listed above of applying the pickup device of Andrea and the threshold circuit(s) of Carlson. The signal line connection, including the switch element (25), "a controller using the error signal to compensate for the acoustic pick-up being mispositioned by providing the audio signals from at least one of the first microphone and the second microphone to an output".

To one of ordinary skill in the art at the time the invention was made, it would have been obvious to include the directionality switching circuitry (23,25) of Ruegg to control the microphone input switching circuitry (1910) of Andrea in response to the threshold signal of Carlson in the system of Carlson in view of Andrea. The implementation of such a microphone system would have been desirable because the microphone system of Ruegg would have been able to automatically determine the presence of a desired sound source in a desired direction, and process the sound accordingly. Such an arrangement would have also been able to automatically process sound that, while still desired, is not in the predetermined direction. Alternately stated, the system of Ruegg enables the appropriate directionality of a response pattern to be selected based on the detected input conditions.

Regarding **Claim 2**, Carlson discloses that five processed versions of the received speech or a generated tone can be fed back to the user a microphone position indicator, based on the threshold of signal (col. 7, lines 36-59 and col. 9, lines 17-28). This reads on "an

indicator utilizing the error signal to generate an indication of the acoustic pick-up device being mispositioned".

Regarding **Claim 3**, both of the systems of Carlson and Ruegg involve the processing of an input signal, wherein the processing decisions are based on the processed input signal (col. 6, lines 7-28). This reads on "the error signal is determined after the audio signals are received by the position estimation circuit".

Regarding **Claim 4**, Andrea discloses that omnidirectional sensitivity patterns may be the basis for the microphone input calculations in the system (col. 23, lines 11=15 and col. 38, lines 31-36). This reads on "the first microphone and the second microphone are both omnidirectional microphones".

Regarding **Claim 5**, an op amp (16) is arranged in the system of Andrea for subtracting the inputs of the two microphones in order to derive a signal comprising substantially speech (col. 12, lines 55-67). This reads on "a noise canceling microphone signal adapted from a difference between the audio signals received from the first microphone and the audio signals received from the second microphone".

Regarding **Claim 6**, a reversing switch (23) is included in the system of Ruegg for transmitting the spherically or directionally sensitive input signal to the output amplifier (19) and speaker (21) (col. 3, lines 14-28). This reads on "the controller includes a switch for transferring the audio signals from one of the first and second microphones to the output".

Regarding **Claim 7**, in the talk thru mode of the system of Andrea, the input response pattern is changed from noise canceling to omnidirectional by disconnecting one of the microphones from the input lines (col. 34, lines 38-43). This switching and these response patterns, in view of the controls and parallel response patterns of Ruegg, read on "a switch transferring a combined signal to the output, the combined signal generated from a difference between the audio signals received from the first microphone and the audio signal received from the second microphone".

Regarding **Claim 8**, please refer above to the rejection of ther similar limitations of Claims 1 and 7, noting that a differential amplifier (500) produces the combined signal in the system of Andrea and the combined signal response pattern of Andrea corresponds to the directional microphone pattern of Ruegg.

Regarding **Claim 9**, Figure 8 illustrates that the difference is produced in part through the use of a summing circuit (314), which reads on "the device comprises a summing unit" (col. 21, lines 5-21).

Regarding **Claim 10**, the multiple "a" and "b" threshold detectors (24,25) function as position sensors because of the associations of input levels with proximity of a source the input receiver (col. 3, lines 33-4 and col. 6, lines 8-11 and 39-59 of Carlson). These detectors, including the circuitry used for implementing the corresponding signal processing, read on "a sensor capable of determining the acoustic pick-up device being mispositioned".

Regarding **Claim 13**, the first microphone (12) of Andrea is disclosed as being preferably less than an inch away from the desired sound source and Figure 3a shows that the second microphone is further from the sound source than the first microphone (col. 14, lines 2-6). This reads on "the first microphone is disposed closer to the desired acoustic source than the second microphone".

Regarding **Claim 14**, Figure 8 of Carlson illustrates one embodiment that involves the use of three threshold detectors (24,25,61). The "g" threshold detector (61) detects the presence, but unacceptable level, of speech (col. 8, lines 66-68). Accordingly, a signal not surpassing threshold "g" is logically considered to not be present. Carlson also teaches that a signal that does not surpass either of the "a" and "b" threshold levels as being too far or having no speech (col. 9, lines 62-68 and col. 10, lines 1-15). Collectively, the equivalent conditions detected by either of the "g" and/or "a" thresholds read on "a device determining whether the desired acoustic source is operational". As discussed in regards to Claim 10, the "a" and "b" threshold detectors are equated in the system of Carlson to proper and improper pick-up device positioning (col. 3, lines 33-4 and col. 6, lines 8-11 and 39-59 of Carlson). These detectors (24,25) read on "a sensor determining that the acoustic device pick-up is mispositioned". The outputs of the three threshold detectors (24,25,61) in the device of Figure 8 are connected to a logic circuit (63) that appropriately controls a switch (65)

(col. 9, lines 4-16). This connection reads on "coupled to the device".

Regarding **Claim 15**, Carlson discloses that a distortion generator (33) and supergain generator (34) can be used to provide altered versions of the input speech signal as feedback to the user (col. 6, lines 31-53). In accordance with Figure 11, Carlson discloses that when the input signal exceeds threshold "g", but not threshold "a", the signal is present, but at an unacceptable level (col. 8, lines 66-68). When the level is less than threshold "a", which is higher than threshold "g", a low pitched tone is provided to the output of a speaker, indicating to a user that the microphone is not properly positioned (col. 9, lines 4-9). When the level exceeds threshold "b", which is higher than thresholds "g" and "a", a high pitched tone may be provided to the output of a speaker, indicating to a user that the microphone is not properly positioned (col. 8, lines 45-59). Both of these conditions reads on "when the acoustic source is operational and when the sensor determines that the acoustic pick-up device is mispositioned according to a predetermined threshold that is exceeded". Carlson also discloses that other types of speech, such as the distorted or amplified speech, can be substituted for the tone feedback signals (col. 9, lines 17-28). This reads on "the audio signals from at least one of the first microphone and the second microphone are provided to the output".

Regarding **Claim 19**, please refer above to the rejection of the similar limitations of Claim 1.

Regarding **Claim 20**, the combination of the microphones in the system of Andrea converts the sensitivity pattern received from the two microphones from a non-directional pattern to a noise canceling (col. 33, lines 47-55). This operation is controlled through the operation of switches (1910,1925,1930), which parallels the switch utilized by the feedback decision means in the system of Ruegg (col. 34, lines 38-43 of Andrea; col. 3, lines 14-24 of Ruegg). Collectively, these teachings thus read on "said control means adjusts a polar pattern of the audio signals received from the first and second microphone means".

Regarding **Claim 21**, please refer above to the rejection of the similar limitations of Claim 5.

Regarding **Claim 22**, please refer above to the rejection of the similar limitations of Claim 1.

Regarding **Claim 23**, please refer above to the rejection of the similar limitations of Claims 4 and 5.

Regarding **Claim 24**, please refer above to the rejection of the similar limitations of Claim 2.

Regarding **Claim 25**, please refer above to the rejection of the similar limitations of Claim 4.

Regarding **Claim 27**, please refer above to the rejection of the similar limitations of Claim 20, noting that non-directional is also referred to as omnidirectional.

Regarding **Claim 28**, please refer above to the rejection of the similar limitations of Claim 1, noting that thresholds "g" and "b" of

Carlson both represent amounts of "too far" or "too close" positioning with respect to the desired input source.

Regarding **Claim 29**, please refer above to the rejection of the similar limitations of Claim 4 and 5.

Regarding **Claim 33**, please refer above to the rejection of the similar limitations of Claim 14, noting that a non-directional is also referred to as omnidirectional.

3. **Claims 11-12, 16-18, 26, and 30-32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson in view of Andrea and Ruegg as applied above, and further in view of Hou (US 2001/0028718).

As detailed above, Carlson discloses a system for detecting the improper positioning of a microphone based on the detected input level of a signal. Andrea discloses a noise canceling microphone system that involves the use of a pair of input microphones. Ruegg discloses a microphone system that adjusts the sensitivity pattern of a microphone system based on the input level of a signal, wherein higher input levels are associated with a desired sound source at a particular direction and distance. The two microphones in the system of Ruegg each have a spherical and directional sensitivity pattern, respectively (col. 2, lines 60-67).

Carlson in view of Andrea and Ruegg does not teach:

- a programmable phase shift network adapted to produce a range of phase shifts in the audio signals from the second microphone

- a device producing a combined signal based on the phase shifted signals and the signals from the first microphone, with the device being capable of transferring the combined signal to the output

Hou discloses a microphone unit with adaptive, direction-based control of the produced audio signal. One embodiment of the system is generally shown in Figure 3. As can be seen, this system involves a pair of microphones (mic1,mic2) that are subtracted to form a directional output signal (para. 0016,0018). A feedback block is included to provide the second microphone signal with an optimal delay value for providing the system with a minimal energy value, which equates to a maximum attenuation of noise and a maximum signal-to-noise ratio (para. 0031,0032,0034). The optimal delay is selected based on a comparison between the energy content of previous and current signal samples, within predetermined limitations (para. 0037-0039). When an greater energy value or higher signal to noise ratio is discovered, the resulting delay increment is negative and the delay is decreased (para. 0021). This 'lower than' indication is also considered to be an the error signal representing an estimate of the acoustic pickup device being mispositioned, since the minimizing of energy equates to a maximized signal-to-noise ratio (para. 0034). The system has an unchanging response in the direction of the assumed preferred sound source, though Figure 2 illustrates that the delay cause increases and decreases in the reception of audio signals from other directions (para. 0031). The delays given as examples range

from 0 to 34 microseconds, and the delay amounts are associated with angular orientations (para. 0007, Figure 2). Such an order of delay are recognized in the art to be equivalent to phase shifting the signal. The delay means of Figure 3 of Hou are considered to read on "a programmable phase shift network adapted to produce a range of phase shifts in the audio signals from the second microphone". Figures 3 and 6 illustrate that the signals are negatively combined with subtraction units (subtraction, sub1-sub3), which read on "a device producing a combined signal based on those signals being phase shifted and on the audio signals received from the first microphone, the device being further capable of transferring the combined signal to the output".

To one of ordinary skill in the art at the time the invention was made, it would have been obvious to incorporate the dual microphone and adjustable delay system of Hou as part of the input portion of the system of Carlson in view of Andrea and Ruegg. The motivation behind such a modification would have been that the system of Hou would have enabled the sensitivity pattern of the combined system to be adjusted more than the two patterns of Carlson in view of Ruegg. As can be seen in Figure 2 of Hou, this adjustment enables the signal-to-noise ratio to be maximized through the minimizing of undesired directions as well as the maximizing of reception in desired directions. The multiple sensitivity patterns of Hou are also obtainable through the use of the same two microphone inputs, whereas the system of Ruegg

utilizes two different microphones for the two different sensitivity pick-up patterns.

Regarding **Claim 12**, the two signals in the system of Hou are combined using adding or subtracting means, which reads on "the device comprises a summing unit" (para. 0032).

Regarding **Claim 16**, Carlson teaches the use of multiple threshold detectors (24,25,61) for determining the proper or improper positioning of the microphone (col. 6, lines 8-11; col. 9, lines 4-8; Figure 11). The system of Hou involves a "calculation of delay increment" that continuously determines a delay increment that is added to the current delay value (para. 0020,0036). The delay increment is negative or positive depending on if the change in energy between current and previous output signals is positive or negative (para. 0039). In an alternate embodiment, multiple, delay values are applied to a signal, and the one with the maximized signal to noise ratio is selected for output (para. 0043). Each of these signal detection means reads on "a first circuit determining progressive levels of the acoustic pickup device being mispositioned with respect to the desired acoustic source". The detected increment is applied to a delay generator in the system of Hou, such that a negative energy difference creates a decrease in delay and a positive energy difference creates an increase in delay (para. 0039). The implemented delay is limited between minimum and maximum ranges (para. 0036). This delay generator reads on "a second circuit determining a corresponding phase shift based on a particular one of the progressive

levels determined". Figure 3 demonstrates that the delay is implemented into the second microphone signal line, which reads on "said corresponding phase shift being introduced with the audio signals received from the second microphone to produce delayed signals (para. 0032). Both embodiments of Figures 3 and 6 illustrate the use of subtracting means (subtraction, sub1-sub3), which reads on "the delayed signals being subtracted from the audio signals received from the first microphone with a result provided to the output".

Regarding **Claim 17**, as cited above, Carlson discloses the use of multiple threshold circuits, which collectively read on "a multi-level comparator" (col. 6, lines 8-11; col. 9, lines 4-8; Figure 11). The positive and negative delay increments based on the positive and negative differences in signal energy of Hou, along with the maximum and minimum limitations, represent a finite number of outputs that may be utilized as the optimal delay (para. 0020,0021). The restrictions of increase or decreased additional delay, along with the maximum or minimum delay, are considered to read on "the second circuit comprises a state machine". The multiple thresholds of Carlson provide an instantaneous description of a signal level, while the cyclical processing of Hou presents a regular, iterative representation of a signal level. Both approaches provide a representation of a signal level upon which physical or electrical adjustments to the input microphones may be made. Accordingly, the collective teachings of Carlson in view of Hou read on "a state machine coupled to the multi-level comparator".

Regarding **Claim 18**, Figure 2 of Hou illustrates polar patterns that may be obtained in a standard version of the microphone input device. These shown patterns are a cardioid, hyper cardiod, and biodirectional (para. 0017, Fig. 2). The directivity patterns of Ruegg include a spherical pattern (Figure 3). These possible sensitivity patterns read on "the corresponding phase shift causes a directional response of a combination of the first and second microphones to include one of a figure eight patter, a cardioid pattern, a hypercardioid pattern, and an omnidirectional pattern".

Regarding **Claim 26**, please refer above to the rejection of the similar limitations of Claim 16.

Regarding **Claim 30**, please refer above to the rejection of the similar limitations of Claim 11, noting that the adjustments alter the overall response pattern of the microphones.

Regarding **Claim 31**, please refer above to the rejection of the similar limitations of Claim 11, noting the cardioid pattern of Figure 2(a) of Hou.

Regarding **Claim 32**, please refer above to the rejection of the similar limitations of Claim 11, noting the figure-eight pattern of Figure 2c of Hou.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Graham

whose telephone number is 571-272-7517. The examiner can normally be reached on Monday-Friday, 8:30 AM to 5:00 PM (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 571-272-7848040. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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October 17, 2005

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